

# Deployment of Java Web Application on Docker Using Jenkins

## 1. Introduction

This project demonstrates the deployment of a Java web application using Jenkins for continuous integration and Docker for containerization. The deployment is hosted on an AWS EC2 instance. The goal is to automate build, test, and deployment processes efficiently.

## 2. Tools Used

Tool	Purpose
Jenkins	CI/CD automation
Docker	Containerization
AWS EC2	Hosting the application
Maven	Build and dependency management
Git	Source code version control

## Architecture:

- EC2 Instance 1: Jenkins, Git, Maven (Ubuntu)
- EC2 Instance 2: Docker Host (Ubuntu)
- Application: Multi-module Maven project (server, webapp)
- Container: Tomcat
- Automation: Jenkins + Publish over SSH Steps Involved:
  1. Setup Jenkins on Ubuntu EC2
  2. Install Git & Maven
  3. Configure multi-module Maven project
  4. Setup Docker Host
  5. Create Dockerfile
  6. Configure Jenkins Job
  7. Automate Build & Deployment

## Verify Application Key Implementation :

Steps :

- server module packaging set to WAR
- Jenkins builds server.war
- Jenkins copies WAR to Docker host via SSH
- Docker builds image with WAR
- Docker runs Tomcat container

## Conclusion

This project demonstrates successful automation of Java web app deployment using Jenkins, Docker, and AWS. Key takeaways include CI/CD setup, containerization, and troubleshooting common deployment issues.

## Output:

Ec2:

<input checked="" type="checkbox"/> jenkins-git	i-0494ddc6e0718ed3c	<input checked="" type="checkbox"/> Running		t3.micro	<input checked="" type="checkbox"/> 3/3 checks passed	<a href="#">View alarms +</a>	us-west-2b	ec2-34-221-
<input checked="" type="checkbox"/> docker	i-0eb83e6aa0e1b98f5	<input checked="" type="checkbox"/> Running		t3.micro	<input checked="" type="checkbox"/> 3/3 checks passed	<a href="#">View alarms +</a>	us-west-2b	ec2-44-246

Jdk & mvn :

```
No VM guests are running outdated hypervisor (qemu) binaries on this host.
ubuntu@ip-172-31-34-2:~$ java -version
openjdk version "21.0.9" 2025-10-21
OpenJDK Runtime Environment (build 21.0.9+10-Ubuntu-124.04)
OpenJDK 64-Bit Server VM (build 21.0.9+10-Ubuntu-124.04, mixed mode, sharing)
ubuntu@ip-172-31-34-2:~$ wget https://dlcdn.apache.org/maven/maven-3/3.9.12/binaries/apache-maven-3.9.12-bin.tar.gz -P /tmp
--2025-12-31 06:26:53-- https://dlcdn.apache.org/maven/maven-3/3.9.12/binaries/apache-maven-3.9.12-bin.tar.gz
Resolving dlcdn.apache.org (dlcdn.apache.org)... 151.101.2.132, 2a04:4e42:644
Connecting to dlcdn.apache.org (dlcdn.apache.org)|151.101.2.132|:443... connected.
HTTP request sent, awaiting response... 200 OK
Length: 923336 (8.8M) [application/x-gzip]
Saving to: '/tmp/apache-maven-3.9.12-bin.tar.gz'

apache-maven-3.9.12-bin.tar.gz      100%[=====]  8.80M  --.-KB/s   in 0.09s
2025-12-31 06:26:53 (101 MB/s) - '/tmp/apache-maven-3.9.12-bin.tar.gz' saved [9233336/9233336]

ubuntu@ip-172-31-34-2:~$ sudo tar xf /tmp/apache-maven-*.tar.gz -C /opt

ubuntu@ip-172-31-34-2:~$ sudo chmod +x /etc/profile.d/maven.sh
ubuntu@ip-172-31-34-2:~$ source /etc/profile.d/maven.sh
ubuntu@ip-172-31-34-2:~$ mvn -version
Apache Maven 3.9.12 (848fb4bf2d427b72bdb2471c22fcfd7ebd9a7a1)
Maven home: /opt/maven
Java version: 21.0.9, vendor: Ubuntu, runtime: /usr/lib/jvm/java-21-openjdk-amd64
Default locale: en, platform encoding: UTF-8
OS name: "linux", version: "6.14.0-1015-aws", arch: "amd64", family: "unix"
ubuntu@ip-172-31-34-2:~$ |
```

Jdk & mvn Environmental path:

```

GNU nano 7.2
export JAVA_HOME=/usr/lib/jvm/default-java
export M2_HOME=/opt/maven
export MAVEN_HOME=/opt/maven
export PATH=${M2_HOME}/bin:${PATH}

```

## Jenkins:

```

root@ip-172-31-29-182:~$ sudo systemctl status jenkins.service
● jenkins.service - Jenkins Continuous Integration Server
   Loaded: loaded (/usr/lib/systemd/system/jenkins.service; enabled; preset: enabled)
     Active: active (running) since Fri 2026-01-09 07:45:29 UTC; 3min 40s ago
       Main PID: 543 (java)
         Tasks: 37 (limit: 1017)
        Memory: 394.2M (peak: 422.7M)
          CPU: 28.936s
        CGroup: /system.slice/jenkins.service
                  └─543 /usr/bin/java -Djava.awt.headless=true -jar /usr/share/java/jenkins.war --webroot=/var/cache/jenkins/war --httpPort=8080

Jan 09 07:45:26 ip-172-31-29-182 jenkins[543]: 2026-01-09 07:45:26.780+0000 [id=31]           INFO      jenkins.InitReactorRunner$1#onAttained: Started all b>
Jan 09 07:45:26 ip-172-31-29-182 jenkins[543]: 2026-01-09 07:45:26.798+0000 [id=35]           INFO      jenkins.InitReactorRunner$1#onAttained: Augmented al>
Jan 09 07:45:27 ip-172-31-29-182 jenkins[543]: 2026-01-09 07:45:27.683+0000 [id=31]           INFO      h.p.b.g.GlobalTimeOutConfiguration$load: global time>
Jan 09 07:45:29 ip-172-31-29-182 jenkins[543]: 2026-01-09 07:45:29.599+0000 [id=34]           INFO      jenkins.InitReactorRunner$1#onAttained: System config>
Jan 09 07:45:29 ip-172-31-29-182 jenkins[543]: 2026-01-09 07:45:29.600+0000 [id=34]           INFO      jenkins.InitReactorRunner$1#onAttained: System config>
Jan 09 07:45:29 ip-172-31-29-182 jenkins[543]: 2026-01-09 07:45:29.744+0000 [id=30]           INFO      jenkins.InitReactorRunner$1#onAttained: Loaded all j>
Jan 09 07:45:29 ip-172-31-29-182 jenkins[543]: 2026-01-09 07:45:29.748+0000 [id=35]           INFO      jenkins.InitReactorRunner$1#onAttained: Configuration>
Jan 09 07:45:29 ip-172-31-29-182 jenkins[543]: 2026-01-09 07:45:29.810+0000 [id=30]           INFO      jenkins.InitReactorRunner$1#onAttained: Completed in>
Jan 09 07:45:29 ip-172-31-29-182 jenkins[543]: 2026-01-09 07:45:29.847+0000 [id=24]           INFO      hudson.lifecycle.Lifecycle#onReady: Jenkins is fully>

```

### Getting Started

## Unlock Jenkins

To ensure Jenkins is securely set up by the administrator, a password has been written to the log ([not sure where to find it?](#)) and this file on the server:

`/var/lib/jenkins/secrets/initialAdminPassword`

Please copy the password from either location and paste it below.

Administrator password

.....|

Continue

## Jdk & mvn path:

JDK installations

+ Add JDK

Java JDK

Name: java

JAVA\_HOME: /usr/lib/jvm/java-21-openjdk-amd64

Install automatically ?

Maven installations

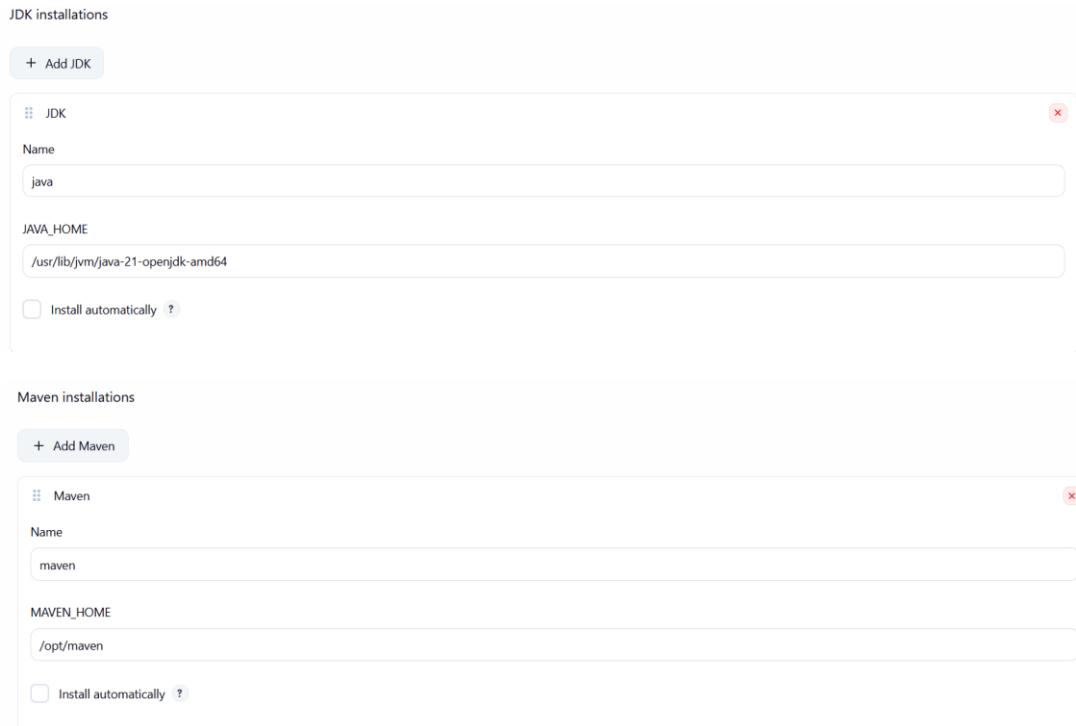
+ Add Maven

Maven

Name: maven

MAVEN\_HOME: /opt/maven

Install automatically ?



## New Jenkins job:

Status: DevOps-Project-01

</> Changes

Workspace

Build Now

Configure

Delete Project

GitHub Hook Log

Rename

New Project

Permalinks

- Last build (#3), 58 min ago
- Last stable build (#3), 58 min ago
- Last successful build (#3), 58 min ago
- Last completed build (#3), 58 min ago

Builds > ...

Filter: #3

Today

#3 6:05 AM



## Docker:

```
ubuntu@ip-172-31-29-137:~$ docker info
Client: Docker Engine - Community
  Version: 29.1.3
  Context: default
  Debug Mode: false
  Plugins:
    buildx: Docker Buildx (Docker Inc.)
      Version: v0.30.1
      Path: /usr/libexec/docker/cli-plugins/docker-buildx
    compose: Docker Compose (Docker Inc.)
      Version: v5.0.1
      Path: /usr/libexec/docker/cli-plugins/docker-compose

Server:
  permission denied while trying to connect to the docker API at unix:///var/run/docker.sock
ubuntu@ip-172-31-29-137:~$ |
```

```
ubuntu@ip-172-31-29-137:~$ sudo su
root@ip-172-31-29-137:/home/ubuntu# cd ~
root@ip-172-31-29-137:~# docker ps
CONTAINER ID        IMAGE               COMMAND             CREATED            STATUS              PORTS
a776a1ce0025        tomcat:v1          "catalina.sh run"   53 minutes ago   Up 53 minutes   0.0.0.0:8086->8080/tcp, :::8086->8080/tcp   NAMES
d65dfa09468b        1b6ale45687e       "catalina.sh run"   2 hours ago     Up 2 hours      0.0.0.0:8087->8080/tcp, :::8087->8080/tcp   myapp
root@ip-172-31-29-137:~# |
```

```
root@ip-172-31-29-137:~# docker images
```

IMAGE	ID	DISK	USAGE	CONTENT	SIZE	EXTRA
myapp:v1	94c31b175f3b	595MB		156MB	156MB	U
tomcat:latest	689475f36b76	587MB		157MB	157MB	U
tomcat:v1	152e9e8d29e8	595MB		156MB	156MB	U
tomcatserver:latest	4657211b6655	595MB		156MB	156MB	U

Tomcat :

User :

dockeradmin

```
dockeradmin:x:1001:1001:Jagadish,5,9944258534,9944258534,other:/home/dockeradmin:/bin/bash
root@ip-172-31-29-137:/etc# |
```

Now in order to access the server using the newly created User we need to allow password-based authentication. For that, we need to do some changes in the /etc/ssh/sshd\_config file.

root@ip-172-31-29-137:~# vi /etc/ssh/sshd\_config file.

```
# To disable tunneled clear text passwords, change to no here!
PasswordAuthentication yes
PubkeyAuthentication yes
KbdInteractiveAuthentication yes
ChallengeResponseAuthentication yes
UsePAM yes
#PermitEmptyPasswords no
```

## Publish over SSH

SSH Servers

SSH Server
Name ? docker
Hostname ? 172.31.29.137
Username ? dockeradmin
Remote Directory ? /home/dockeradmin
<input type="checkbox"/> Avoid sending files that have not changed ?

Jenkins configure:

The screenshot shows the Jenkins configuration interface for a Git project. On the left, a sidebar lists 'Source Code Management' (selected), 'Triggers', 'Environment', 'Build Steps', and 'Post-build Actions'. The main panel is titled 'Git' and shows a 'Repositories' section. It includes fields for 'Repository URL' (set to 'https://github.com/Jagadishsrvn/DevOps-Project.git'), 'Credentials' (set to '- none -'), an 'Advanced' dropdown, and a '+ Add Repository' button. Below this is a 'Branches to build' section with a single branch listed.

## Triggers

Set up automated actions that start your build based on specific events, like code changes or scheduled times.

- Trigger builds remotely (e.g., from scripts) ?
- Build after other projects are built ?
- Build periodically ?
- GitHub hook trigger for GITScm polling ?
- Poll SCM ?

## Post-build Actions

Define what happens after a build completes, like sending notifications, archiving artifacts, or triggering other jobs.

The screenshot shows the Jenkins configuration interface for 'Post-build Actions'. It includes sections for 'SSH Publishers' and 'Transfers'.

**SSH Publishers:** A 'SSH Server' named 'docker' is selected. An 'Advanced' dropdown is available.

**Transfers:** A 'Transfer Set' is defined with 'Source files' set to 'Project-1/hello-world/webapp/target/\*.war'. The 'Remove prefix' field contains 'Project-1/hello-world/webapp/target'.

Docker file:

```
root@ip-172-31-29-137:/opt/docker# cat Dockerfile
FROM tomcat:9.0
RUN cp -R /usr/local/tomcat/webapps.dist/* /usr/local/tomcat/webapps
COPY ./*.war /usr/local/tomcat/webapps/
root@ip-172-31-29-137:/opt/docker# |
```

```
dockeradmin@ip-172-31-29-137:/opt/docker$ ls
Dockerfile  webapp.war
dockeradmin@ip-172-31-29-137:/opt/docker$ |
```

← ⏪ Not secure 44.246.228.119:8086/webapp/

## New user Register for DevOps Learning

Please fill in this form to create an account.

---

Enter Name  Enter Full Name  
Enter mobile  Enter mobile number  
Enter Email  Enter Email  
Password  Enter Password  
Repeat Password  Repeat Password

---

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← ⏪ 44.246.228.119:8087/webapp/

## New user Register for DevOps Learning

Please fill in this form to create an account.

---

Enter Name   
Enter mobile   
Enter Email   
Password   
Repeat Password

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